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ELEMENTS INDICATING STOCK PRICE MOVEMENTS: THE CASE OF THE COMPANIES LISTED ON THE V4 STOCK EXCHANGES

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Abstract. Stock markets stand as a financial mechanism that provides liquidity for firms and offers diversification benefits for investors. Stock markets in the Eastern European countries are weak-form efficient which exposes them to speculative prices. This study investigates the influence of the macroeconomic and firm-specific factors on stock prices of the listed companies within the Visegrad Stock Markets. The study employs regression analyses based on a Pooled OLS and Fixed Effect models with year dummies and standard errors clustered at the country level, which are robust to autocorrelation and heteroscedasticity. Data collection consists of 55 listed companies based on the weekly stock prices, from January 2013 till December 2018. The results indicate that total equity is the only significant element that influences the individual stock prices of the companies in the four established models. Additionally, increase in supply of shares declines the current stock prices and the other way around. However, the exchange rate and inflation level indicate a negative influence on the stock prices with weaker significance. The findings show that stock markets of the V4 countries are overall inefficient since important indicators, such as economic activity, debt level, cash flow, firm size, oil, and gold prices have limited influence on the stock price movements.

Keywords: stock prices, financial indicators, macroeconomic indicators, Visegrad countries, Pooled OLS, fixed effects.

JEL Classification: G12, G14, G15.

Introduction

Prices are substantial elements for the allocation of physical, human, and financial resources. Stock prices stand as a crucial instrument that generates signals for the investor's decisions. In addition, stock price is influenced by the internal health of the company and the macroeconomic situation of the country. Stock Markets are a source of liquidity for firms and serve as

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a competitive instrument for banks. Efficient Market Hypothesis indicates that equilibrium level is an essential element of the stock prices (Malkiel & Fama, 1970). Prices indicate the fundamental value of the financial assets when stock markets are strong-form efficient. Fama (1968) shows that stock prices stand close to the estimated equilibrium, where deviations from the equilibrium are random and prone to errors. However, Shiller (2001) considers that stock prices contain speculative elements and driven from human euphoria, named as irrational exuberance. In contrast to the commodity markets, financial markets are established under exclusive arrangements. Stock markets reflect expectations for future cash flows while commodity prices are built based on the current intrinsic value of the product. Previous models explain stock price equilibrium as the present value of future dividends. A series of studies confirm that the stock markets of the Visegrad countries (hereafter V4) tend to be weak-form efficiency (Gilmore & McManus, 2003). The inefficiency level indicates that stock prices do not reflect the fundamental situation of the company and the economic prospect of the country. Strong-form efficient markets indicate that stock price involve overall events occurring on the national and international scale.

Eastern European countries were functioning within identical political and economic systems. Nowadays they operate under the common European market with various tax structures, monetary policies, stock markets, government debts, etc. Stock markets of the V4 countries are exposed to the diverse risk level since they do not operate under unique economic systems. Therefore, Aliu et al. (2019) by using diversification techniques confirm that Budapest Stock Exchange (BUX) is the least risky index, followed by the Warsaw Stock Exchange Index (WIG20), and Bratislava Stock Exchange (SAX). Moreover, the results of the study provide indications for the risk benefits of creating a common V4 stock market. Besides, the study by Cera et al. (2019) estimated the risk level of the V4 stock exchanges via using the GARCH model. Results detected that risk level is predicted with the highest accuracy on BUX while with the lowest accuracy on SAX.

Investor sentiments are vastly determined by the financial and economic conditions of the other nation-states. Globalization and deregulation have created interdependency within stock markets, which has dampened the space for the diversification benefits. The stock markets of the V4 countries are insignificant in size to determine movements on the major western stock markets. Moreover, there are other factors that affect changes in stock prices such as degree of integration with other stock exchanges. Recent study by Boțoc and Anton (2020) analysed the integration level between CEE stock markets with those of Germany, UK and USA. Their evidence suggests both short run and long run cointegration based on Johansen cointegration test while principal component analysis indicate consistent degree of dependency. The financial crisis of 2007-08 showed that the world financial system is highly interconnected. Moreover, the US financial problems influenced most of the world stock exchanges. In terms of emerging equity markets, the study by Olbryś and Majewska (2015) investigated the co-integration level of the Visegrad stock indexes during the bear market of 2007–2009. The results indicate a positive increase in the cross-country correlation during the crisis period which creates less space for international diversification. Novotny and Hanousek (2013) studied the influence of the Lehman Brothers' collapse on the Prague Stock Exchange. The results of their work claim that PSE in the short run is highly influenced by

international shocks while in the long run follows its own track. The results concerning the integration of the Eastern stock exchanges with the western ones are diverse. The work by Syriopoulos (2007) investigated the short-run and long-run relationships between Central European stock markets and western stock markets. His research findings indicate short-run dependency, while in the long run no association is identified. The integration of the Czech, Polish and Hungarian stock markets with those of Germany, UK, and the US tends to diminish in the long-run period (Schotman & Zalewska, 2006).

The study explores the relationship between macroeconomic and firm-specific factors with stock prices in the V4 countries. To our best knowledge, this is the first work that incorporates firm-specific factors and macro elements to explain stock price movements in the V4 stock markets. Previous studies used mainly macroeconomic indicators to detect the aggregate movements in the stock indexes of Eastern European countries. The study use stock prices of the individual listed companies, not the accumulated index prices. The results provide evidence for financial investors in explaining the reasons for stock price. Besides, the outcomes of the research generate signals for the regulators and practitioners on the current conditions of the V4 stock markets. In light of the identified problem, the following research questions were built:

*RQ*1: What are the firm-specific factors that influence stock prices in the V4 countries?

*RQ*2: What are the macroeconomic factors that influence stock prices in the V4 countries?

The rest of the paper is structured as follows: Section 1 provides an overview of the literature regarding the macroeconomic factors and firm-specific factors and their effect on overall stock price movements, in regional and international context; Section 2 presents research methodology and explains the research model and data used; Section 3 presents research results, Section 4 discusses the findings and last section provides the conclusions.

1. Literature review

Market equilibrium is an essential tool for the sustainable economic and financial efficiency of the country. Equilibrium imposed on the marketplace is the fundamental concept of the capitalist system. Eastern European countries went from the controlled economy to the market economy where stock exchanges were not part of the economic activities. Differences in the level of capital markets developments in Eastern European countries are largely related to political crises, liquidity problems, inadequate regulation, and limited number of market participants (Pop, 2020). In the case of Poland, the study by Stereńczak (2020) claims that a small proportion of firms listed in Polish equity exchanges possess satisfactory liquidity. Stock markets hold a negligible part within the financial system of the V4 countries. The banking industry in these countries is the key institutional lender of human consumption and business operations (Pražák & Stavárek, 2017).

The macroeconomic situation of the country influences investors' confidence in buying or selling stocks. Exchange rate movements influence trade balance, but also individual sales of the companies involved in the transnational trade. The work of Bahmani-Oskooee and Saha (2016) concluded that exchange rates hold a short-run negative effect on the stock prices in Brazil, Canada, Chile, Indonesia, Japan, Korea, Malaysia, Mexico, and the U.K. while no

long-run relationship was detected. Their work indicated that currency depreciation has a negative effect on stock prices while currency appreciation positively affects stock prices. Furthermore, Ho (2019) in his study found a negative relationship within stock prices in South Africa and the inflation rate. The work realized by Apergis and Eleftheriou (2002) on the period from 1988 till 1999 shows a negative relationship between stock prices and inflation rate on the Athens Stock Exchange. The findings of Anari and Kolari (2001) for six industrial countries identified a negative association between stock prices and inflation rate. Most of the researches regarding the reasons that generate movements on the stock exchanges were realized for the US economy (Campbell & Shiller, 1988; Fama & French, 1993; Bulmash & Trivoli, 1991; Nieh & Lee, 2001; Ratanapakorn & Sharma, 2007).

The regional macroeconomic context might differ from the international one, on the elements influencing the demand for stocks. Diverse studies on the factors influencing stock prices in the V4 countries have been conducted on the various time intervals. The study by Pražák and Stavárek (2017) claims that GDP had a negative influence the stock prices in the V4 countries. In addition, the work of Kulhánek (2012) identified negative influence of GDP on the stock prices of the Visegrad countries. The results for the period 1995–2012 indicate long-run positive relationship within GDP and stock prices. Horobet and Dumitrescu (2009) argued that stock prices on the Prague Stock Exchange (PSE) are positively affected by GDP while negatively influenced by the exchange rate. Weak-form efficiency markets create space for financial investors to generate abnormal returns. The work by Hanousek and Filer (2000) shows that it is likely to generate excess returns from the investments on the stock exchanges of the V4 countries via using public information. In addition, their work claims that the stock markets in these countries have lost the connection with the local and regional economic environment.

Financial indicators play an important role in stock price changes. According to Drummen and Zimmermann (1992) internal financial characteristics of the firm, explain up to 50% of the stock price changes. Consequently, Ligocká and Stavárek (2019) studied the relationship between stock prices and financial ratios of the listed companies in Austria, Switzerland, and Poland. Their work indicates that none of the selected financial ratios showed a significant influence on Switzerland's stock prices. The impact of the financial ratios on 101 firms listed on the Athens Stock Exchange, from 1995 till 2004 was seriously analysed by Dimitropoulos and Asteriou (2009). The results indicate that total assets and net profit to sales have a negative impact on the stock prices while sales to total assets have a positive effect. Irfan and Nishat (2002) on their study identified that dividend payment, firm size and leverage have a significant positive effect on Pakistan Stock Exchange. Earnings per share, GDP, interest rate and exchange rate show a positive influence on the Nigerian Stock Exchange (Somoye et al., 2009). In contrast, the study with thirty companies listed on the Nigerian Stock Exchange shows that financial leverage positively influences stock prices (Uwuigbe et al., 2012). However, Uddin (2009) conducted a study with the financial service companies listed on the Dhaka Stock Exchange and identified a positive association within stock prices and size of the company.

Studies performed on the eastern European countries concerning the financial components that influence stock prices show contradictory findings. Seeing that Dzikevičius and Šaranda (2011) examined the relationship between financial performance and the stock prices of the

listed companies on the Lithuanian Stock Exchange, their results show that equity ratios have a positive effect while debt ratios show a negative impact on stock prices. However, the study conducted by Filip and Raffournier (2010) in the case of the Bucharest Stock Exchange (BVB) indicates a weak relationship between financial ratios and stock prices compared to the western stock exchanges. The weak relationship on the BVB is justified with the market inefficiency and the high concentration of the financial system in the banking industry.

Uncertainties imposed on the gold and oil prices negatively affect investments, aggregate output, and consumption, which are an important source of the stock price movements (Bams et al., 2017; Vveinhardt et al., 2017; Jain & Biswal, 2016). The study by Tursoy and Faisal (2018) in the case of Turkey identified a long-run and short-run positive association between stock prices, gold prices, and oil prices. Singhal et al. (2019) studied the dynamic relationship among international oil prices, gold prices, and exchange rates, with the stock market prices in the Mexico Stock Exchange. The results of their study suggest that international gold prices have a positive effect on stock prices, while oil prices hold negative influence on stock prices. However, Raza et al. (2016) indicate that gold prices have a positive impact on most of the BRICS stock markets while the negative impact on the stock markets of Mexico, Malaysia, Thailand, Chile, and Indonesia.

The Visegrad countries in the early 1990s began the process of economic transformation, with capital market being part of this restructuring. Moreover, accession into European Union (EU) enabled these countries an increase in a standard of living and a rapid growth of financial markets. The current study is built on the regional context and it treats the phenomena on the scope of Visegrad countries (Czech Republic, Slovakia, Poland, and Hungary). The work analyses the demand for stocks and the factors influencing it, not the supply side of the problem. In contrast to the previous studies focused on Eastern European stock exchanges our work was able to check the influence of macroeconomic and firm-specific factors into a single model. The authors recognize that the work was covered under a limited time interval, from 2013 till 2018.

2. Methodology

2.1. Model specification

In order to examine the effect of macroeconomic and firm-specific factors on the average stock prices, the Pooled OLS and Fixed Effect (FE) models were employed with year fixed effects and standard errors clustered at the country level, which is robust to heteroscedasticity and autocorrelation. We set up a balanced panel data set covering the period 2013–2018 for the V4 countries such as Czech Republic, Poland, Slovakia, and Hungary.

The determinants of the average stock prices for the aforementioned countries can be captured by the subsequent baseline regression model:

$$ASP_{it} = \beta_0 + \beta_1 \sum_{k=1}^{7} Firm\_specific_{it} + \beta_2 \sum_{k=8}^{16} Controls_{it} + \varepsilon_{it}\ , \tag{1}$$

where ASP_{it} is the dependent variable which denotes the average stock prices of country i at time t; $Firm\_specific_{it}$ shows the firm-specific variables of country i at time t numbered by

$k \in \{1, 3, \ldots, 7\}$, sequenced with following fundamental firm-specific characteristics: *Total Liabilities (TL), Total Equity (TE), Net Cash Flow (NCF), Firm Size (FS), Liquidity Ratio (LR)*; $Controls_{it}$ indicates the control variables (i.e., macroeconomic variables) of country *i* at time *t* numbered by $k \in \{8, 10, \ldots, 16\}$, such as *Gross Domestic Product (GDP), Inflation Rate (INF), Exchange Rate (EXCH), Gold Price (GOLD), Oil Price (OIL), Business Confidence Index (BCI);* β_0 is the constant term, and ε_{it} is the standard error. The control variables (i.e., macroeconomic variables) were added to our analysis by following the prior studies discussed in the previous section (Bams et al., 2017; Pražák & Stavárek, 2017; Raza et al., 2016; Tursoy & Faisal, 2018; Vveinhardt et al., 2017; Bahmani-Oskooee & Saha, 2016; Kulhánek, 2012; Nieh & Lee, 2001).

Table 1. Definition and measurement of study variables and data sources (source: authors' elaboration)

Variable type	Variable name	Definition/Measurement	Source of data
Dependent variable	Average stock prices (ASP)	Average price of a stock determined by the market valuation of stockholders equity	Thomson Reuters Eikon Database
Firm-specific variables	Total Liabilities (TL)	The combined debts and obligations that the company owes to outside parties	Financial statements of listed companies
	Total Equity (TE)	Total assets minus liabilities, book value	Financial statements of listed companies
	Net Cash Flow (NCF)	Difference between a company's cash inflows and outflows in a given period	Financial statements of listed companies
	Firm Size (FS)	The natural logarithm of total assets	Financial statements of listed companies
Control variables (macro-economic variables)	Gross Domestic Product (GDP)	GDP per capita, current prices (EUR per capita)	World Economic Outlook (IMF)
	Inflation Rate (INF)	Inflation rate, end of period consumer prices (Annual percent change)	World Economic Outlook (IMF)
	Exchange Rate (EXCH)	Real effective exchange rate index (2010=100)	World Bank database
	Gold Price (GOLD)	Yearly average gold price, EUR per ounce	World Bank Commodity Price Data
	Oil Price (OIL)	Yearly average oil price, EUR per barrel	World Bank Commodity Price Data
	Business Confidence Index (BCI)	Monitor the output growth in the industry sector / Long-term average = 100	OECD Database

Table 1 shows the criteria for assessing the selected companies' specific characteristics, macroeconomic variables, and data sources. We further use the robust tests to see whether the alternatives samples matter because our sample consists of countries with various numbers of observations. As per Hsiao (2005), pooling countries in panel data analysis can cause country-specific information to be lost. To ease this problem, the methodology of DeFond et al. (2015) was followed by dropping one country at a time from our sample sizes.

2.2. Data and sample

This study used secondary data on stock prices of listed companies on the V4 stock markets. The data set is obtained on a weekly basis from the *Thomson Reuters Eikon database* and covers the period from January 2013 until December 2018. Stock prices of the listed companies are arranged on the identical dates and in the identical currency (Euro). Considering that the study basically assesses the macroeconomic and firm-specific factors influencing the average stock prices of the V4 countries, the sample of the study is composed of 55 listed companies based on the procedure of sample selection elaborated in Table 2. Data regarding firm-specific factors were collected from audited financial statements on the annual basis. Macroeconomic data for the individual countries were obtained from the IMF World Economic Outlook database, World Bank database (WDI), and OECD Economic Outlook database.

Table 2. Summary of sample selection

Sample selection	Number
Total number of companies listed on the selected V4 stock exchanges:	**73**
Bratislava Stock Exchange (BSSE) (Slovakia)	12
Prague Stock Exchange (PSE) (Czech Republic)	16
Budapest Stock Exchange (BUX) (Hungary)	25
Warsaw Stock Exchange Index (WIG20) (Poland)	20
Less: Delisting companies during period 2013–2018	(10)
Less: Companies with unavailable or missing annual audited data	(2)
Less: Outlier and influential observations[a]	(6)
Final sample	**55**
Firm-year observations (balanced panel)	**330**

Note: [a] An observation is deemed to be an outlier and influential and will be deleted if its standardized residual > ±2, leverage > $3(k + 1)/n$ and covariance ratio < $1 - [3(k + 1)/n]$, where k is the number of predictor variables and n is the number of observations.

3. Research results

Table 3 shows the descriptive statistics and correlation matrix for the whole sample of the variables used in the analysis. Besides, VIF test was depicted to confirm that multicollinearity does not pose a warning to our model.

Following less than 5 acceptable threshold level from the studies such as (Yoo et al., 2014; Salmerón-Gómez et al., 2016; Daoud, 2017), our VIF test results indicates values for each independent variable below the value of 5 threshold (VIF < 5), as the multicollinearity is not big concern in the current study.

Table 4 shows the results of our Pooled OLS and Fixed Effect (FE) models for the average stock prices through the specifications 1(1a)–5(5a). *Specification 1(1a)* represents the *baseline model*. The results of the robustness tests through the *Specification 2(2a)–5(5a)* in Pooled OLS models reveal that the effect of total equity on the average stock prices does not depend

Table 3. Descriptive statistics and matrix of correlations between variables (source: authors' own calculations / p-values in parentheses: * p < 0.05, ** p < 0.01, *** < 0.001)

Variables	Mean	SD	VIF	1	2	3	4	5	6	7	8	9	10	11
1. Average Stock Prices (ASP)	62.57	111.68		1										
2. Total Liabilities (TL)	7,815.80	12,751.67	3.55	0.273*	1									
3. Total Equity (TE)	2,367.13	2,852.24	3.93	−0.080	0.565*	1								
4. Net Cash Flow (NCF)	563.34	900.98	2.51	0.114*	0.660*	0.651*	1							
5. Firm Size (FS)	7.52	2.11	3.17	0.103	0.640*	0.720*	0.490*	1						
6. Gross Domestic Product (GDP)	11,527.57	2,037.92	1.41	0.003	0.184*	0.056	0.206*	0.029	1					
7. Inflation Rate (INF)	1.06	1.25	2.16	−0.040	0.015	−0.010	0.032	−0.066	−0.211*	1				
8. Exchange Rates (EXCH)	93.75	3.55	2.63	0.005	−0.064	−0.064	−0.098	0.005	−0.117*	0.095	1			
9. Gold Price (GOLD)	1,106.80	88.8	3.90	−0.022	−0.011	−0.015	−0.005	−0.010	−0.027	0.588*	0.085	1		
10. Oil Price (OIL)	61.03	17.39	2.29	−0.021	−0.045	−0.028	−0.041	−0.026	−0.074	−0.099	0.657*	0.062	1	
11. Business Confidence Index (BCI)	100.24	0.85	4.18	−0.070	−0.047	−0.058	−0.031	−0.141*	−0.081	−0.310*	−0.617*	−0.597*	−0.552*	1

Table 4. The results of Pooled OLS and Fixed Effect (FE) models [Dependent variable: ASP-Average Stock Prices] (source: Authors' calculations /p-values in parentheses: * p < 0.05, ** p < 0.01, *** p < 0.001)

Variables / Specifications	*OLS*	*FE*	*OLS*	*FE*	*OLS*	*FE*	*OLS*	*FE*	*OLS*	*FE*
	(1)	(1a)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)	(5a)
TL	0.00350 (0.075)	−0.000466 (0.244)	**0.00401*** (0.043)	−0.000974 (0.091)	0.00146 (0.169)	−0.000131 (0.910)	0.00382 (0.113)	−0.000440 (0.349)	0.00454 (0.099)	−0.000564 (0.187)
TE	**−0.0228**** (0.004)	0.00185 (0.362)	**−0.0151*** (0.045)	**0.00522*** (0.040)	**−0.0257**** (0.007)	−0.000312 (0.921)	**−0.0225*** (0.012)	0.00213 (0.241)	−0.0204 (0.064)	0.000462 (0.837)
NCF	0.00409 (0.828)	−0.00252 (0.436)	**-0.0235*** (0.044)	−0.00578 (0.101)	**0.0392*** (0.015)	0.000692 (0.458)	0.00400 (0.855)	−0.00284 (0.416)	0.00142 (0.940)	−0.00282 (0.418)
FS	4.440 (0.683)	16.66 (0.173)	15.39 (0.103)	14.98 (0.288)	−2.062 (0.875)	7.953 (0.328)	0.854 (0.948)	16.49 (0.246)	−16.37 (0.480)	**31.44*** (0.025)
DR	−49.90 (0.104)	0.226 (0.976)	−46.75 (0.173)	−4.785 (0.627)	−43.72 (0.371)	−0.156 (0.983)	−63.33 (0.093)	3.659 (0.718)	−18.67 (0.764)	−11.91 (0.413)
GDP	−0.00281 (0.325)	−0.00386 (0.640)	**−0.0209*** (0.036)	−0.0115 (0.106)	**−0.0140*** (0.014)	−0.00181 (0.750)	−0.00419 (0.347)	0.00440 (0.079)	−0.0103 (0.143)	−0.0129 (0.534)
INF	**−12.97*** (0.014)	2.058 (0.494)	−12.08 (0.232)	4.187 (0.150)	−1.514 (0.448)	−1.391 (0.415)	−11.36 (0.057)	4.775 (0.181)	−5.178 (0.484)	−2.277 (0.457)
EXCH	**−3.769*** (0.041)	1.847 (0.129)	2.265 (0.500)	2.624 (0.084)	−1.023 (0.425)	0.0994 (0.897)	−2.794 (0.632)	**0.873*** (0.044)	**−3.968**** (0.003)	2.476 (0.202)
GOLD	−0.0722 (0.742)	−0.0793 (0.294)	−0.162 (0.255)	−0.164 (0.065)	0.120 (0.417)	0.0643 (0.177)	−0.285 (0.484)	−0.102 (0.183)	0.302 (0.129)	−0.0187 (0.859)
OIL	−0.0487 (0.961)	−0.176 (0.292)	−0.576 (0.433)	−0.277 (0.090)	0.208 (0.715)	0.0820 (0.711)	−0.850 (0.713)	−0.182 (0.137)	**2.339*** (0.013)	0.146 (0.698)
BCI	−35.80 (0.193)	2.091 (0.386)	−29.12 (0.213)	1.764 (0.502)	12.25 (0.395)	4.884 (0.259)	−58.09 (0.069)	−0.331 (0.881)	**30.66*** (0.034)	6.836 (0.111)
Constant	4085.9 (0.195)	−311.0 (0.329)	3107.3 (0.228)	−163.2 (0.669)	−1384.9 (0.446)	−570.0 (0.264)	6574.2 (0.066)	−50.80 (0.878)	−2888.7 (0.051)	−920.8 (0.092)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of countries	4	4	3	3	3	3	3	3	3	3
Observations	330	330	252	252	210	210	294	294	234	234
R^2	0.287	0.197	0.337	0.242	0.415	0.196	0.298	0.209	0.315	0.262

on individual countries. Dropping one country at a time does not affect our main research questions. *Specification 2(2a), 3(3a), 4(a)* and *5(5a)* includes V4 countries by excluding in each time Czech Republic, Poland, Slovakia, and Hungary, respectively.

Our empirical results reveals that total equity (TE) in first four specifications of Pooled OLS shows a negative association with average stock prices, except *Specification 5*. Although, total equity demonstrates positive sign at 1% level in *baseline Pooled OLS model* (β = 0.0228; p = 0.004) and *Specification 3* (β = 0.0257; p = 0.007), its significance level decrease to 5% level in *Specification 2* (β = 0.0151; p = 0.045) and *Specification 4* (β = 0.0225; p = 0.012). Overall, this means that a one-unit change in total equity, proxied using total assets minus liabilities in book values in our sample, is related with a –0.015 (minimum) and –0.026 (maximum) changes in average stock prices. Put in other way, changes in averages stock prices can be generated with the total equity but those values are not highly sensitive to total equity. Conversely, the effect of total equity was positively related to dependent variable in *Specification 2a* (β = 0.0052; p = 0.040) of FE model.

Total liabilities (TL) are positively associated with the average stock prices in *Specification 2* (β = 0.0040; p = 0.043) of Pooled OLS model. We find that a one unit increase in the total liabilities leads to an increase in average stock prices, approximately 0.004 units. While, Net cash flow (NCF) is negatively associated with the average stock prices in the *Specification 2* (β = –0.0235; p = 0.044) of Pooled OLS model, its effect is positively related with the average stock prices in the Specification 3 (β = –0.0257; p = 0.007) of Pooled OLS model. Firm size (FS) is positively associated with the average stock prices in the *Specification 5* (β = 31.44; p = 0.025) of FE model.

The GDP is found to be negative in *Specification 2* (β = –0.0209; p = 0.036) and *Specification 3* (β = –0.0140; p = 0.014) of Pooled OLS model. Inflation rate (INF) in *the baseline Pooled OLS model* is negative and significant with average stock prices (β = –12.97; p = 0.014), consistent with the prior research (Apergis & Eleftheriou, 2002). A one-unit increase in the inflation rate in the V4 countries is associated with the 12.97 unit decrease in average stock prices. An increase in exchange rate (EXCH) by one unit is associated with a 3.76 unit decrease in average stock prices (β = –3.769; p = 0.041) in the *baseline Pooled OLS* model. Additionally, its significant negative effect at 1% level is depicted in *Specification 5* (β = –3.968; p = 0.003). This supports the previous studies (Bahmani-Oskooee & Saha, 2016; Singhal et al., 2019; Horobet & Dumitrescu, 2009) who predicted that exchange rate negatively influences stock prices. Conversly, exchange rate is positively associated with the dependent variable in fixed effect models, especially in *Specification 4a* (β = 0.873; p = 0.044). Therefore, we cannot consider the effect of exchange rate on the dependent variable as an economically significant effect. In *Specification 5*, the coefficient of the business confidence index (BCI) shows a positive sign in *Specification 5* (β = 30.66; p = 0.034). The same applies to the effect of oil prices (OIL) on the stock prices as it gets a statistically significant positive effect in *Specification 5* (β = 2.339; p = 0.013).

In addition, untabulated findings (which were submitted to the reviewers and are available from the authors), show that the reverse causality and endogeneity issues were ruled out by considering the dynamic nature of relationship between stock prices and macroeconomic and firm-specific factors. Using System generalized method-of-moments (GMM) (Rood-

man, 2009), the firm-specific factors were treated as endogenous, while the macroeconomic variables were treated as exogenous variables. Moreover, the lag of dependent variable was included to the model to capture the effect of the past performance of the stock prices on the new stock prices. The results are statistically significant and indicate that the old prices affect the new prices in the stock market. The results and sign of the coefficients from GMM estimator are substantively equal for the other main interest of the variables from both Pooled OLS and FE models.

4. Discussion

The central aim of the study was to delve into nuances of influencing factors on average stock prices by exploring the effects of macroeconomic and firm-specific factors on the average stock prices. A significant theoretical contribution of the study is that total equity is the main firm-specific factor in explaining variations in the average stock prices, which is obtained from simple Pooled OLS regression. Our arguments center on the V4 countries and show that increasing total equity of the listed firms in the V4 countries has implications for the balancing average stock prices. The findings clarify the literature by incorporating firm-specific variables with macroeconomic variables, assisting to reconcile the mixed evidences in the existing literature on the factors affecting stock prices. From a managerial point of view, the findings of our work inform investors and portfolio managers on the importance of macroeconomic and firm-specific factors in stock price changes. Moreover, policymakers are informed with a new perspective on the reasons why stock exchanges in these countries are inefficient.

Ligocká and Stavárek (2019) identified that return on equity negatively affect stock prices of the food companies listed on the Polish Stock Market. In contrast to Ligocká and Stavárek (2019) that used only food companies listed on the Polish Stock Exchange, our work is completed with a bigger sample of listed companies in the V4 countries. The results of our study confirm that beside total equity as a significant element other important factors do not contain a vital influence on the stock price movements. However, Dzikevičius and Šaranda (2011) show the positive relationship within equity ratios and stock prices, in the case of Lithuania. In contrast, our work is not focused on the equity ratios but on the total equity as the accounting item. Results concerning exchange rate influence on the stock prices, our results correspond with the previous studies (Bahmani-Oskooee & Saha, 2016; Singhal et al., 2019; Horobet & Dumitrescu, 2009) while in contrast to the study conducted by Somoye et al. (2009). Standard textbook theories claim that exchange rate changes is an important element since it makes goods and services cheaper or more expensive in international trade. The negative association between inflation and stock prices in our work stands in line with the previous studies (Ho, 2019; Apergis & Eleftheriou, 2002; Anari & Kolari, 2001). Prices of goods and services create uncertainty for the investors since the discounted present value of their investments is lower when general prices are increasing. The weak impact of macroeconomic and firm-specific factors in V4 stock markets may be related to the fact that exchanges in these countries are still an unknown form for raising capital. Moreover, financial literacy may be other reasons or investors still do not consider these countries as a safe zone for investments.

Conclusions

Stock markets are an important instrument for channelizing funds from savers to borrowers. The financial system in the V4 countries is mainly focused on the banks as the lender of last resort. V4 stock markets are characterized by inefficiency level and an insignificant number of listed companies. Weak-form efficiency attached to the V4 stock markets shows that stock prices do not integrate overall national and international economic events. The study investigated the influence of the macroeconomic and firm-specific factors on stock prices of the listed companies within the Visegrad Stock Markets. The results of the study confirm that total equity is the most significant element influencing stock prices in the V4 countries. Total equity is an accounting item that stands for changes in common stocks, preferred stocks and retained earnings. To the best interpretation of our results, stock price movements occur when the number of preferred or common stocks is changing within the capital structure of the listed companies. Raising the number of stocks (preferred or common) declines the stock prices, which stands in line with the theoretical paradigms. In addition, increasing the number of stocks decline the market value of the existing stocks. Fundamental movements of the stock prices in the V4 countries arises when companies issue new stocks or buy back outstanding ones.

The control variable for exchange rate (EXCH) negatively influences stock prices and shows significance in the *baseline model (1)*. Exchange rate appreciation decline stock prices since dampens the international position (export volume) in terms of goods and services. Companies listed in the V4 stock markets are multinational in the scope where exchange rate movements impact their sales. The control variable for inflation (INF) shows a negative influence on the stock prices which stands with theoretical expectations where an increase in the general prices shrinks real returns on the financial investments.

Indicators such as cash flow, firm size, debt level, economic activity, gold, and oil prices play an important role in the stock price movements. However, the insignificance level of these elements on the average stock prices in baseline models might be linked with the financial literacy of the investors in these countries. Visegrad countries have a short history of active trading with stocks which might be an additional reason that investors lack knowledge on the importance of financial and macroeconomic indicators. Standing on the obtained results and recognizing the limitations of the work, average stock prices in the V4 countries are prone to information asymmetry which is reflected on the insignificance level attached to the important indicators. Future research might identify a longer time interval of the phenomena with a larger sample size of the selected companies.

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